

SEQUENCE LISTING

<110> Fuchs, Renate
Wilske, Bettina
Motz, Manfred
Soutscheck, Erwin
Preeac-Mursic, Vera

<120> Active proteins from *Borrelia burgdorferi*

<130> 738.001US3

<150> US 09/196,293

<151> 1998-11-19

<150> US 08/209,603

<151> 1994-03-10

<150> US 07/862,535

<151> 1992-06-19

<150> WO PCT/EP90/02282

<151> 1990-12-21

<150> DE P40 18 988.0

<151> 1990-06-13

<150> DE P39 42 728.5

<151> 1989-12-22

<160> 16

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<213> *Borrelia burgdorferi*

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39

<210> 2

<211> 20

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<213> *Borrelia burgdorferi*

<400> 2

Glu	Leu	Asp	Lys	Glu	Lys	Leu	Lys	Asp	Phe	Val	Asn	Leu	Asp	Leu	Glu
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Phe	Val	Asn	Thr												
			20												

<210> 3

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<213> *Borrelia burgdorferi*

<400> 3

garytdgaya argaraaryt daargaytty gtwaayytdg ayyadgartt ygtwaaytay
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60

61

<210> 4
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 <213> *Borrelia burgdorferi*

<400> 4
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 aatgcaaggg aagttgataa ggaaaaatta aaggactttg ttaatatgga tcttgaattt 120
 gttaattaca agggtcctta tgattctaca aatacatatg aacaaatagt aggtattggg 180
 gagtttttag caaggccgtt gatcaattcc aatagtaagt caagttatta tggtaaatat 240
 tttgttaata gatttattga cgatcaagat aaaaaagcaa gtgttgatat tttttctatt 300
 ggtagtaagt cagagcttga tagtatatta aatctaagaa gaattc 346

<210> 5
 <211> 663
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 5
 Met Lys Lys Met Leu Leu Ile Phe Ser Phe Phe Leu Val Phe Leu Asn
 1 5 10 15
 Gly Phe Pro Leu Asn Ala Arg Glu Val Asp Lys Glu Lys Leu Lys Asp
 20 25 30
 Phe Val Asn Met Asp Leu Glu Phe Val Asn Tyr Lys Gly Pro Tyr Asp
 35 40 45
 Ser Thr Asn Thr Tyr Glu Gln Ile Val Gly Ile Gly Glu Phe Leu Ala
 50 55 60
 Arg Pro Leu Ile Asn Ser Asn Ser Asn Ser Tyr Tyr Gly Lys Tyr
 65 70 75 80
 Phe Val Asn Arg Phe Ile Asp Asp Gln Asp Lys Lys Ala Ser Val Asp
 85 90 95
 Ile Phe Ser Ile Gly Ser Lys Ser Glu Leu Asp Ser Ile Leu Asn Leu
 100 105 110
 Arg Arg Ile Leu Thr Gly Tyr Leu Ile Lys Ser Phe Asp Tyr Glu Arg
 115 120 125
 Ser Ser Ala Glu Leu Ile Ala Lys Ala Ile Thr Ile Tyr Asn Ala Val
 130 135 140
 Tyr Arg Gly Asp Leu Asp Tyr Tyr Lys Glu Phe Tyr Ile Glu Ala Ser
 145 150 155 160
 Leu Lys Ser Leu Thr Lys Glu Asn Ala Gly Leu Ser Arg Val Tyr Ser
 165 170 175
 Gln Trp Ala Gly Lys Thr Gln Ile Phe Ile Pro Leu Lys Lys Asn Ile
 180 185 190
 Leu Ser Gly Asn Val Glu Ser Asp Ile Asp Ile Asp Ser Leu Val Thr
 195 200 205
 Asp Lys Val Val Ala Ala Leu Ser Glu Asn Glu Ser Gly Val Asn
 210 215 220
 Phe Ala Arg Asp Ile Thr Asp Ile Gln Gly Glu Thr His Lys Ala Asp
 225 230 235 240
 Gln Asp Lys Ile Asp Ile Glu Leu Asp Asn Phe His Glu Ser Asp Ser
 245 250 255
 Asn Ile Thr Glu Thr Ile Glu Asn Leu Arg Asp Gln Leu Glu Lys Ala
 260 265 270
 Thr Asp Glu Glu His Lys Lys Glu Ile Glu Ser Gln Val Asp Ala Lys
 275 280 285
 Lys Lys Gln Lys Glu Glu Leu Asp Lys Lys Ala Ile Asp Leu Asp Lys
 290 295 300
 Ala Gln Gln Lys Leu Asp Phe Ala Glu Asp Asn Leu Asp Ile Gln Arg
 305 310 315 320
 Asp Thr Val Arg Glu Lys Leu Gln Glu Asn Ile Asn Glu Thr Asn Lys
 325 330 335
 Glu Lys Asn Leu Pro Lys Pro Gly Asp Val Ser Ser Pro Lys Val Asp

340 345 350
 Lys Gln Leu Gln Ile Lys Glu Ser Leu Glu Asp Leu Gln Glu Gln Leu
 355 360 365
 Lys Glu Ala Ser Asp Glu Asn Gln Lys Arg Glu Ile Glu Lys Gln Ile
 370 375 380
 Glu Ile Lys Lys Asn Asp Glu Glu Leu Phe Lys Asn Lys Asp His Lys
 385 390 395 400
 Ala Leu Asp Leu Lys Gln Glu Leu Asn Ser Lys Ala Ser Ser Lys Glu
 405 410 415
 Lys Ile Glu Gly Glu Glu Glu Asp Lys Glu Leu Asp Ser Lys Lys Asn
 420 425 430
 Leu Glu Pro Val Ser Glu Ala Asp Lys Val Asp Lys Ile Ser Lys Ser
 435 440 445
 Asn Asn Asn Glu Val Ser Lys Leu Ser Pro Leu Asp Glu Pro Ser Tyr
 450 455 460
 Ser Asp Ile Asp Ser Lys Glu Gly Val Asp Asn Lys Asp Val Asp Leu
 465 470 475 480
 Gln Lys Thr Lys Pro Gln Val Glu Ser Gln Pro Thr Ser Leu Asn Glu
 485 490 495
 Asp Leu Ile Asp Val Ser Ile Asp Ser Ser Asn Pro Val Phe Leu Glu
 500 505 510
 Val Ile Asp Pro Ile Thr Asn Leu Gly Thr Leu Gln Leu Ile Asp Leu
 515 520 525
 Asn Thr Gly Val Arg Leu Lys Glu Ser Ala Gln Gln Gly Ile Gln Arg
 530 535 540
 Tyr Gly Ile Tyr Glu Arg Glu Lys Asp Leu Val Val Ile Lys Ile Asp
 545 550 555 560
 Ser Gly Lys Ala Lys Leu Gln Ile Leu Asp Lys Leu Glu Asn Leu Lys
 565 570 575
 Val Ile Ser Glu Ser Asn Phe Glu Ile Asn Lys Asn Ser Ser Leu Tyr
 580 585 590
 Val Asp Ser Arg Met Ile Leu Val Val Lys Asp Asp Ser Asn Ala
 595 600 605
 Trp Arg Leu Ala Lys Phe Ser Pro Lys Asn Leu Asp Glu Phe Ile Leu
 610 615 620
 Ser Glu Asn Lys Ile Leu Pro Phe Thr Ser Phe Ala Val Arg Lys Asn
 625 630 635 640
 Phe Ile Tyr Leu Gln Asp Glu Leu Lys Ser Leu Val Thr Leu Asp Val
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 Asn Thr Leu Lys Lys Val Lys
 660

<210> 6
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 <212> PRT
 <213> Borrelia burgdorferi

<400> 6
 Lys Ile Thr Asp Ser Asn Ala Thr Val Leu Ala Val Lys
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<210> 7
 <211> 11
 <212> PRT
 <213> Borrelia burgdorferi

<400> 7
 Asp Leu Phe Glu Ser Val Glu Gly Leu Leu Lys
 1 5 10

<210> 8
 <211> 40

<212> DNA
 <213> *Borrelia burgdorferi*

<400> 8
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<210> 9
 <211> 34
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 9
 gayytdttyg arwcwgtwga rgghytdytd aara 34

<210> 10
 <211> 639
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 10
 atgaaaaaga atacattaag tgcgatatta atgactttat ttttatttat atcttgtaat 60
 aattcagggg aggtggggat tctgcatcta ctaatcctgc tgacgagtct tgcgaaaggg 120
 cctaattctta cagaaataag caaaaaaatt acagattcta atgcatttgt acttgctggt 180
 aaagaagttg agacttttgg tttatctata gatgaacttg ctaagaaagc tattggtcaa 240
 aaaatagaca ataataatgg tttagctgct ttaaataatc agaattggatc gttggttagca 300
 ggagcctatg caatatcaac cctaataaca gaaaaattga gtaaattgaa aaatttagaa 360
 gaattaaaga cagaaattgc aaaggctaag aaatgttccg aagaatttac taataaacta 420
 aaaagtgggc atgcagatct tggcaaacag gatgctaccg atgatcatgc aaaagcagct 480
 attttaaaaa cacatgcaac taccgataaa ggtgctaaag aatttaaaga tttatttgaa 540
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 acaagtccctg ttgtagcaga aagtccaaaa aaaccttaa 639

<210> 11
 <211> 212
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 11
 Met Lys Lys Asn Thr Leu Thr Ala Ile Leu Met Thr Leu Phe Leu Phe
 1 5 10 15
 Ile Ser Cys Asn Asn Ser Gly Lys Val Gly Ile Leu Thr Ser Thr Asn
 20 25 30
 Pro Ala Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys
 35 40 45
 Lys Ile Thr Asp Ser Asn Ala Phe Val Leu Ala Val Lys Glu Val Glu
 50 55 60
 Thr Leu Val Leu Ser Ile Asp Glu Leu Ala Lys Lys Ala Ile Gly Gln
 65 70 75 80
 Lys Ile Asp Asn Asn Asn Gly Leu Ala Ala Leu Asn Asn Gln Asn Gly
 85 90 95
 Ser Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Thr Glu Lys
 100 105 110
 Leu Ser Lys Leu Lys Asn Leu Glu Glu Leu Lys Thr Glu Ile Ala Lys
 115 120 125
 Ala Lys Lys Cys Ser Glu Glu Phe Thr Asn Lys Leu Lys Ser Gly His
 130 135 140
 Ala Asp Leu Gly Lys Gln Asp Ala Thr Asp Asp His Ala Lys Ala Ala
 145 150 155 160
 Ile Leu Lys Thr His Ala Thr Thr Asp Lys Gly Ala Lys Glu Phe Lys
 165 170 175
 Asp Leu Phe Glu Ser Val Glu Gly Leu Leu Lys Ala Ala Gln Val Ala
 180 185 190

Leu Thr Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser
 195 200 205
 Pro Lys Lys Pro
 210

<210> 12
 <211> 680
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 12
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 gtttagcagcc ttgatgaaaa aaacagcgct tcagtagatt tgcctggtga gatgaaagtt 120
 cttgtaagta aagaaaaaga caaagacggt aagtacagtc taaaggcaac agtagacaag 180
 attgagctaa aaggaacttc tgataaagac aatgggtctg ggggtgcttga aggtacaaaa 240
 gatgacaaaa gtaaagcaaa attaacaatt gctgacgatc taagtaaaac cacattcgaa 300
 cttttcaaag aagatggcaa aacattagtg tcaagaaaag taagttctaa agacaaaaca 360
 tcaacagatg aaatgttcaa tgaaaaaggt gaattgtctg caaaaacat gacaagagaa 420
 aatggaacca aacttgaata tacagaaatg aaaagcgatg gaaccgaaa agctaaagaa 480
 gttttaaaaa actttactct tgaagggaaa gtagctaatt ataaagtaac attggaagta 540
 aaagaaggaa ccgttacttt aagtaaggaa attgcaaaat ctggagaagt aacagttgct 600
 cttaatgaca ctaacactac tcaggctact aaaaaaactg gcgcatggga ttcaaaaact 660
 tctacttttaa caattagtgt 680

<210> 13
 <211> 273
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 13
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 1 5 10 15
 Cys Lys Gln Asn Val Ser Ser Leu Asp Glu Lys Asn Ser Ala Ser Val
 20 25 30
 Asp Leu Pro Gly Glu Met Lys Val Leu Val Ser Lys Glu Lys Asp Lys
 35 40 45
 Asp Gly Lys Tyr Ser Leu Lys Ala Thr Val Asp Lys Ile Glu Leu Lys
 50 55 60
 Gly Thr Ser Asp Lys Asp Asn Gly Ser Gly Val Leu Glu Gly Thr Lys
 65 70 75 80
 Asp Asp Lys Ser Lys Ala Lys Leu Thr Ile Ala Asp Asp Leu Ser Lys
 85 90 95
 Thr Thr Phe Glu Leu Phe Lys Glu Asp Gly Lys Thr Leu Val Ser Arg
 100 105 110
 Lys Val Ser Ser Lys Asp Lys Thr Ser Thr Asp Glu Met Phe Asn Glu
 115 120 125
 Lys Gly Glu Leu Ser Ala Lys Thr Met Thr Arg Glu Asn Gly Thr Lys
 130 135 140
 Leu Glu Tyr Thr Glu Met Lys Ser Asp Gly Thr Gly Lys Ala Lys Glu
 145 150 155 160
 Val Leu Lys Asn Phe Thr Leu Glu Gly Lys Val Ala Asn Asp Lys Val
 165 170 175
 Thr Leu Glu Val Lys Glu Gly Thr Val Thr Leu Ser Lys Glu Ile Ala
 180 185 190
 Lys Ser Gly Glu Val Thr Val Ala Leu Asn Asp Thr Asn Thr Thr Gln
 195 200 205
 Ala Thr Lys Lys Thr Gly Ala Trp Asp Ser Lys Thr Ser Thr Leu Thr
 210 215 220
 Ile Ser Val Asn Ser Lys Lys Thr Thr Gln Leu Val Phe Thr Lys Gln
 225 230 235 240
 Asp Thr Ile Thr Val Gln Lys Tyr Asp Ser Ala Gly Thr Asn Leu Glu
 245 250 255

Gly Thr Ala Val Glu Ile Lys Thr Leu Asp Glu Leu Lys Asn Ala Leu
 260 265 270
 Lys

<210> 14
 <211> 341
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 14
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 Ala Ser Arg Asn Asn Ala Ile Asn Ala Asn Leu Ser Lys Thr Gln
 20 25 30
 Glu Lys Leu Ser Ser Asn Tyr Arg Ile Asn Arg Ala Ser Asp Asp Ala
 35 40 45
 Ala Gly Met Gly Val Ser Gly Lys Ile Asn Ala Gln Ile Arg Gly Leu
 50 55 60
 Ser Gln Ala Ser Arg Asn Thr Ser Lys Ala Ile Asn Phe Ile Gln Thr
 65 70 75 80
 Thr Glu Gly Asn Leu Asn Glu Val Glu Lys Val Leu Val Arg Met Lys
 85 90 95
 Glu Leu Ala Val Gln Ser Gly Asn Gly Thr Tyr Ser Asp Ser Asp Arg
 100 105 110
 Gly Ser Ile Gln Ile Glu Ile Glu Gln Leu Thr Asp Glu Ile Asn Arg
 115 120 125
 Ile Ala Asp Gln Ala Gln Tyr Asn Gln Met His Met Leu Ser Asn Lys
 130 135 140
 Ser Ala Ser Gln Asn Val Lys Thr Ala Glu Glu Leu Gly Met Gln Pro
 145 150 155 160
 Ala Lys Ile Asn Thr Pro Ala Ser Leu Ser Gly Ser Gln Ala Ser Trp
 165 170 175
 Thr Leu Arg Val His Val Gly Ala Asn Gln Asp Glu Ala Ile Ala Val
 180 185 190
 Asn Ile Tyr Ser Ala Asn Val Ala Asn Leu Phe Ala Gly Glu Gly Ala
 195 200 205
 Gln Ala Ala Gln Ala Ala Pro Val Gln Glu Gly Ala Gln Glu Glu Gly
 210 215 220
 Ala Gln Gln Pro Thr Pro Ala Thr Ala Pro Thr Gln Gly Gly Val Asn
 225 230 235 240
 Ser Pro Val Asn Val Thr Thr Thr Val Asp Ala Asn Thr Ser Leu Ala
 245 250 255
 Lys Ile Glu Asn Ala Ile Arg Met Ile Ser Asp Gln Arg Ala Asn Leu
 260 265 270
 Gly Ala Phe Gln Asn Arg Leu Glu Ser Ile Lys Asn Ser Thr Glu Tyr
 275 280 285
 Ala Ile Glu Asn Leu Lys Ala Ser Tyr Ala Gln Ile Lys Asp Ala Thr
 290 295 300
 Met Thr Asp Glu Val Val Ala Ala Thr Thr Asn Ser Ile Leu Thr Gln
 305 310 315 320
 Ser Ala Met Ala Met Ile Ala Gln Ala Asn Gln Val Pro Gln Tyr Val
 325 330 335
 Leu Ser Leu Leu Arg
 340

<210> 15
 <211> 209
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 15

Met	Lys	Lys	Asn	Thr	Leu	Ser	Ala	Ile	Leu	Met	Thr	Leu	Phe	Leu	Phe
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Ile	Ser	Cys	Asn	Asn	Ser	Gly	Lys	Asp	Gly	Asn	Thr	Ser	Ala	Asn	Ser
			20					25					30		
Ala	Asp	Glu	Ser	Val	Lys	Gly	Pro	Asn	Leu	Thr	Glu	Ile	Ser	Lys	Lys
		35				40						45			
Ile	Thr	Asp	Ser	Asn	Ala	Val	Leu	Leu	Ala	Val	Lys	Glu	Val	Glu	Ala
	50					55					60				
Leu	Leu	Ser	Ser	Ile	Asp	Glu	Ile	Ala	Ala	Lys	Ala	Ile	Gly	Lys	Lys
65				70						75					80
Ile	His	Gln	Asn	Asn	Gly	Leu	Asp	Thr	Glu	Asn	Asn	His	Asn	Gly	Ser
			85					90						95	
Leu	Leu	Ala	Gly	Ala	Tyr	Ala	Ile	Ser	Thr	Leu	Ile	Lys	Gln	Lys	Leu
		100						105					110		
Asp	Gly	Leu	Lys	Asn	Glu	Gly	Leu	Lys	Glu	Lys	Ile	Asp	Ala	Ala	Lys
		115					120					125			
Lys	Cys	Ser	Glu	Thr	Phe	Thr	Asn	Lys	Leu	Lys	Glu	Lys	His	Thr	Asp
	130					135					140				
Leu	Gly	Lys	Glu	Gly	Val	Thr	Asp	Ala	Asp	Ala	Lys	Glu	Ala	Ile	Leu
145					150					155					160
Lys	Thr	Asn	Gly	Thr	Lys	Thr	Lys	Gly	Ala	Glu	Glu	Leu	Gly	Lys	Leu
			165					170						175	
Phe	Glu	Ser	Val	Glu	Val	Leu	Ser	Lys	Ala	Ala	Lys	Glu	Met	Leu	Ala
			180					185					190		
Asn	Ser	Val	Lys	Glu	Leu	Thr	Ser	Pro	Val	Val	Ala	Glu	Ser	Pro	Lys
		195					200					205			

Pro

<210> 16

<211> 13

<212> PRT

<213> Borrelia burgdorferi

<400> 16

Met	Thr	Met	Ile	Thr	Asn	Ser	Arg	Gly	Ser	Ile	Met	Ile
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